

LOK JAGRUTI UNIVERSITY (LJU)
INSTITUTE OF ENGINEERING AND TECHNOLOGY

Department of Chemical Engineering (708)

Bachelor of Engineering (B.E.) - Semester – III

Course Code:	017083304
Course Name:	Unit Processes and Chemical Technology
Category of Course:	Professional Core Course (PCC)
Prerequisite Course:	Basic Knowledge of Chemistry

Teaching Scheme				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Total Hours
4	0	0	4	40

Syllabus				
Unit No.	Topic	Prerequisite Topic	Successive Topic	Teaching Hours
01	Chemical Processing and Work of Chemical Engineering			2 (5 %)
	1.1 Basic Chemical Data , Globally and Indian Chemical Industry			
	1.2 Batch and Continuous Processing, Flowcharts in unit operation		Continuous Contact Equipment (017083402-Unit 5.8)	
02	Water			4 (10 %)
	2.1 Water Treatment for Industrial and Domestic Use		Industrial water pollution management (017083404-Unit - 6)	
	2.2 Hardness of Water			
	2.3 Demineralization, Deionization and Desalination by Reverse osmosis, Ion exchange and electro-dialysis	Water Technology (017081201- Unit-5)	Ion exchange (017083503-Unit-9)	
03	Sulphur and Sulphuric Acid			4 (10 %)
	3.1 Mining and Manufacturing of Sulphur			
	3.2 Manufacture of Sulphuric Acid by DCDA Process			
	3.3 Major Engineering Problems			
04	Fertilizer Industry			6 (15 %)
	4.1 Introduction to Fertilizer Industries			
	4.2 NPK Fertilizer			
	4.3 Manufacturing Process of Ammonia, Urea , and Nitric Acid	Principles and Mechanisms of Organic Reactions-I (017081101 - Unit 3), Introduction to various organic Processes (017081101 - Unit 9)		
	4.4 Major Engineering Problems			
05	Chlor-alkali Industry			4 (10 %)
	5.1 Manufacturing of Caustic Soda and Chlorine by Membrane Cell, Mercury and Diaphragm Cell Process			
	5.2 Manufacturing of Sodium carbonate			
06	Dye Industry			6 (15 %)
	6.1 Classification of Dye According to its Constitution and Application	Stereochemistry (017081101 - Unit 2)		
	6.2 Various Dyes Such as Azo Dyes, Indigo dye etc			
	6.3 Various Dye Intermediates and its Manufacturing Based on Unit Processes			
	6.4 Manufacturing Processes of Chrome Blue Black, H-Acid, Nitrobenzene, Aniline etc			
07	Sugar, Paints and Pigments			4 (10 %)
	7.1 Manufacturing of Sugar , Paints	Engineering Materials (017082101 - Unit 1)	Application of Crystallization (017083402-Unit 10.5)	
	7.2 Different Types of Pigments Such as White, Blue, Red, Yellow, Green etc			
	7.3 Varnishes, Industrial Coatings, Polishes etc			
08	Fermentation Industry			4 (10 %)
	8.1 Industrial Alcohol, Absolute Alcohol		Applications of Distillation (017083503-Unit 10.1)	
	8.2 Beers, Wines, and Liquors			
	8.3 Manufacturing of Butyl Alcohol and Citric Acid by Fermentation			
09	Cement Industry			4 (10 %)
	9.1 Cement and its Types			
	9.2 Settling and Hardening of Cement	Processing of Materials (017082101-Unit 10)		
	9.3 Cement Manufacturing by Wet and Dry Process		Dry versus Wet Grinding (017083502-Unit-3.4)	

10	Pulp and Paper Industry			2 (5 %)
	10.1 Pulp Manufacturing by Kraft Process			
	10.2 Difference Between Sulphate and Sulphite Process			
	10.3 Manufacturing of Paper			

Proposed Theory + Practical Evaluation Scheme by Academicians (% Weightage Category Wise and it's Marks Distribution)						
L:	4	T:	0	P:	0	
Note: In Theory Group, Total 4 Test (T1+T2+T3+T4) will be conducted for each subject. Each Test will be of 25 Marks. Each Test Syllabus Weightage: Range should be 20% - 30%						
Group (Theory or Practical)	Group (Theory or Practical) Credit	Total Subject Credit	Category	% Weightage	Marks Weightage	
Theory	4	4	MCQ	100%	100	
Theory			Theory Descriptive	0%	0	
Theory			Formulas and Derivation	0%	0	
Theory			Numerical	0%	0	
Expected Theory %	100%			Calculated Theory %	100%	100
Practical	0			Individual Project	0%	0
Practical			Group Project	0%	0	
Practical			Internal Practical Evaluation (IPE)	0%	0	
Practical			Viva	0%	0	
Practical			Seminar	0%	0	
Expected Practical %	0%		Calculated Practical %	0%	0	
Overall %	100%			100%	100	

Course Outcome	
	<i>Upon completion of the course students will be able to</i>
1	Understand the basic principles and concepts of chemical engineering processes and understand the importance of water treatment and sulfuric acid in various industries and its role in chemical manufacturing processes.
2	Gain knowledge about the fertilizer industry and understand the chemical reactions, equipment, and operating conditions involved in ammonia, urea, and nitric acid, sodium carbonate production and caustic soda.
3	To equip knowledge about different dyes and their manufacturing process, along with sugar, paints and pigments production.
4	Understand production of alcohol, cement, pulp and paper and to understand their importance in chemical manufacturing process.
Suggested Reference Books	
1	"Outlines of Chemical Technology" (Edited and Revised by M. Gopala Rao and M. Sittig) by Dryden, C. E., 3rd Edition (1997) East West Press. Pvt. Ltd, New Delhi.
2	Shreve's Chemical Process Industries", 5th Edition, McGraw Hill (1984).
3	"Industrial Chemistry (Including Chemical Engineering)" B K. Sharma, Krishna Publishing House.
4	Encyclopedia of Industrial Chemistry, Ullmann, VCH, 1996.
5	Indian Specialty Chemicals Industry Biggest Beneficiary of The Global Paradigm Shift by FICCI, Sep 29, 2020
6	Fundamentals of Environmental Chemistry , Manahan, Stanley E. , Second edition, Lewis publisher
7	Water Encyclopedia, Domestic, Municipal, and Industrial Water Supply and Waste Disposal (Volume 1) , A John Wiley & Sons, Inc., Publication

List of Open Source Software/Learning Website	
1	https://nptel.ac.in/courses/103/107/103107081/
2	https://www.edx.org/course/drinking-water-treatment-2